SURGICAL TREATMENT OF CHOLELITHIASIS.

A REPORT OF THE OPERATIONS FOR CHOLELITHIASIS, IN THE SERVICE OF DR. A. G. GERSTER, AT MOUNT SINAI HOSPITAL, DURING THE FIVE YEARS, 1898–1902.

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In the entire surgical service of Mount Sinai Hospital during 1898 and 1899, and in the first surgical division during 1900, 1901, and 1902, we have operated upon sixty-one patients for cholelithiasis and its complications. Upon these sixty-one patients sixty-six operations were performed, with a mortality of eighteen, or 29 per cent. This high mortality needs a few words of explanation. It teaches in itself a most important lesson to those who never advise surgical interference until the patients have become exhausted by the pain of repeated attacks of colic, or septic from cholangeitis, or suppurative inflammation of the gall-bladder. The patients who come to the Mount Sinai Hospital are not of the class who select a quiescent period of their disease as a most fitting time for operation; they prefer, as a rule, to wait until threatening manifestations of intense sepsis, arising from cholangeitis, gangrene, or empyema of the gall-bladder, etc., compel them to seek the surgeon's aid. Thus of our sixty-one patients, nineteen had empyema of the gall-bladder, four, extensive gangrene, and six, obstructive jaundice at the time of their admission. Only twenty were admitted in or could be tided over into a quiescent period of the disease.

This delay in resorting to surgical interferenee until the exigencies of the case urgently demand it, accounts for the wretched physical condition in which our patients come to the hospital. They are mostly emaciated, nervous, and exhausted from their oft-repeated and prolonged attacks of pain, fever, and jaundice: their tissues are frequently in a condition of fatty and hyaline degeneration; their kidneys are functionally bad,

and their hearts often the seat of chronic interstitial changes. This accounts for the three deaths from collapse immediately or shortly after operation, even though the latter was not severe or unduly prolonged. Further, the resisting power of their tissues has become so bad that bacteria, which are present in the gall-bladder, find a favorable soil therein, after operation, for rapid increase and development; thus eight cases of rapid and fatal septicæmia, with no peritonitis, arising from septic foci in the gall-bladder or ducts occurred during these five years.

These facts show conclusively that if good results are to follow the surgical treatment of this disease, the patients must be operated upon early. In a previous communication the writer has stated the indications for the medical and surgical treatment to be as follows: (*Medical Record*, 1902. "Indications for medical and surgical treatment of cholelithiasis.")

Medical Treatment.—Cholecystitic pain or attacks of biliary colic, in either case unattended with fever.

Surgical Treatment.

1. Operations of choice, undertaken in the quiescent period; mortality, 2 to 3 per cent.
   (*a*) Severe cholecystitic pain or oft-repeated, uncomplicated attacks of biliary colic, persisting in spite of medical treatment.
   (*b*) After the first attack of acute cholecystitis attended with fever, pain, distention of the gall-bladder.
2. Compulsory operations, undertaken at any time of the day or night, often amidst unfavorable surroundings; high mortality.
   (*a*) Foudroyant or intensely acute attacks of cholecystitis.
   (*b*) Hydrops, empyema, gangrene, or perforation of the gall-bladder, cholæmia, abscess of the liver, diffuse peritonitis.

We *do not* advise surgical interference at the first attack of cholecystitic pain or biliary colic. We base this action upon

our knowledge of the pathogenesis of the lesions that follow upon cholelithiasis. Calculi themselves do not give rise to structural alterations in the gall-bladder; the pathological changes are dependent upon a secondary or mixed infection of this viscus. A primary infection of a diminished virulency, coupled with stasis of the bile, determines the formation of calculi within the gall-bladder or ducts; a secondary infection of varying intensity of virulency determines the acute or chronic inflammatory conditions that result in marked structural alterations and general septic intoxication. The calculi as foreign bodies in an irritable viscus may excite cholecystitic pain or biliary colic; the secondary infection gives rise to hydrops, empyema, gangrene, cholangeitis, etc.

Medicinal, dietetic, and hygienic therapy usually succeed in relieving pain and colic in uncomplicated cases. Surgical interference will only be called for in this class of patients when the pain is continuous and severe, and is not benefited by general therapeutic measures.

The addition of a secondary infection in a calculous gall-bladder marks a strong indication for surgical interference. Our experience goes to show that sooner or later a secondary infection will give rise to such severe local lesions and general intoxication as to demand operation. If the onset of severe local and general disturbances is to be forestalled, recourse to operation must be made as soon as possible after the inception of a secondary infection of the gall-bladder.

As to operation in the acute attack or during a quiescent period. We naturally prefer to operate during a quiescent interval. At such a time the mortality is considerably less, and the search for stones in the gall-bladder and ducts can be made much more thoroughly and satisfactorily. It is in the operations performed during an acute seizure that calculi are overlooked, necessitating secondary operations for their removal.

The gall-bladder is not to be compared to the appendix vermiformis in regard to the urgency of operative interference during a period of acute inflammation. The wall of the latter organ, poor in muscular and elastic fibres, can distend

very little to accommodate the products of inflammation that accumulate in it. With its orifice of exit closed, the rising tension of these confined products is very likely to result in perforation. The gall-bladder, on the other hand, is rich in elastic and muscular tissues; its walls readily stretch and its cavity distends to accommodate the inflammatory exudates; perforation is therefore comparatively rare. Whereas early operation is necessary in acute appendicitis in order to forestall perforation, such action is not often required in acute cholecystitis. We consider that immediate surgical interference is chiefly called for in the face of an advancing septic condition or in extreme distention of the gall-bladder; and that without these conditions it is usually safe to wait for a subsidence of the acute manifestations and operate during the interval. In our sixty-one patients only one, a recurrent empyema after cholecystostomy owing to obstruction of the choledochus, suffered with perforation of the gall-bladder. Forty others had to be operated in the acute period on account of septic manifestations; in these the mortality was 29 per cent. The other twenty were admitted in or could be tided over to the quiescent period; the mortality in these cases was 3 per cent. Here are included three deaths from continued hemorrhage.

THE LATE RESULTS AFTER GALL-STONE OPERATIONS.

The subsequent histories of most of the hospital ward patients cannot be ascertained; they have either changed their places of residence or do not respond to our letters of inquiry. However, as a rule, we have found that our patients return to the hospital for examination, if they suffer from a recurrence of the old malady.

Of those returning to the hospital in this way a number complained of dragging, dull pain in the right hypochondriac regions. The pain did not radiate; they stated that it was of an entirely different character from that with which they had previously suffered. These patients while under our observation never had an attack of biliary colic; no stones were passed

in their stools; they were not jaundiced. After a time the pain became very much less. We considered it was due to adhesions around the gall-bladder and ducts. During the past year we have operated upon two patients not included in this series, upon whom a cholecystostomy had been done in other hospitals. Both patients complained of severe pain in the right hypochondriac and epigastric regions, with marked tenderness over these areas. There had been no jaundice since the first operation; occasional attacks of fever. No stones had been passed since the first operation. The pain resembled that of biliary colic. Reoperation revealed only extensive intimate adhesions around the contracted gall-bladder, and the bile ducts; cholecystectomy and separation of adhesions have freed the patients of their pain.

In three cases postoperative hernie through the scar followed. In two of them, very stout patients, with flaccid abdominal walls, more than one operation had been done; at the last operation, both very large transverse and longitudinal incisions had to be made on account of the numerous and extensive adhesions between the gall-bladder and ducts and neighboring viscera. Radical operation was only once required, as the hernia and its attendant unpleasantness were easily controlled by a well-fitting abdominal belt.

Six of the patients in our series had to be reoperated to remove calculi in the cystic or common ducts that had not been taken out at the first operation. In four of these six cases the stones were impacted in the cystic duct; in two of the latter a previous cholecystostomy in two stages, and in two a cholecystostomy in one sitting had been done. The impacted calculi could be easily felt with a probe introduced through the fistula in the gall-bladder. Another patient in whom a cholecystostomy for empyema had been done returned to the hospital several months after the operation, with a diffuse purulent peritonitis, originating in a rupture of a recurrent empyema of the gall-bladder. The fistula had completely closed, but the common bile duct was obstructed by a large calculus which prevented the free discharge of gall-bladder secretions and bile

into the duodenum. Immediate laparotomy and drainage of the ruptured gall-bladder, and cleansing of the peritoneum, saved this patient's life, and at a third operation the common duct stone was removed, the patient making an uneventful convalescence.

In the sixth patient a cholecystostomy and cysticotomy had been done two years prior to her readmission to the hospital, when she presented all the indications of common duct obstruction. The gall-bladder fistula had healed. Exploration revealed an impacted stone in the choledochus.

In the above patients there can be no doubt that the calculi which were removed at the second operation were present in the ducts when the first one was performed.

In two cases in which cholecystostomy in two stages had been done, the calculi could be felt impacted in the cystic duct when the gall-bladder was first opened. Though their dislodgement was repeatedly attempted, the efforts were not successful. In the other two cases in which the operation was done in one sitting, evidence of the presence of obstruction in the cystic duct was afforded by the persistent patency of the gall-bladder fistula discharging mucus.

In the two cases in which at the secondary operations calculi were found in the common duct, the gall-bladder fistula had remained open for a long time. One patient remained well eight months after its closure, when a rupture of the gall-bladder occurred; in the other the fistula remained patent for seventeen months after the first operation, and from the time of its closure the patient suffered with repeated attacks of biliary colic, chills and fever. (It is to be noted in these last two cases that the gall-bladder closed some time after the primary operation; in one seventeen months and in the other about five months. Neither of these patients presented the symptoms of or gave a previous history of attacks of obstructive jaundice. The tardy closure of the gall-bladder fistula would indicate that the obstructing calculi were at first lodged in the cystic duct, and when they had passed into the common duct the gall-bladder fistula closed. Our experience would

seem to show that obstruction in the common duct, unless it be a very firm impaction, does not interfere with the closure of a gall-bladder fistula; whereas an obstruction in the cystic duct where firm impaction is the rule prevents such closure. Reference to this point will be made under cholecystostomy.)

To our knowledge only one of the other patients in this series presented evidences of a return of the symptoms due to the presence of calculi in the gall-bladder or ducts. Further, in all but this one of the remaining patients, no biliary fistula remained after the primary operation. We must conclude, therefore, that a reformation of calculi after they have been completely removed from the gall-bladder and bile passages must be a very rare occurrence. In this our experience coincides with that of Kehr.

After a close investigation into the subsequent histories of a large number of patients operated upon by him for cholelithiasis he was unable to find any instances in which a true reformation of calculi occurred. In all his cases that presented evidences of the presence of new formation of calculi in the ducts or gall-bladder done for cholelithiasis, he was able to prove that such calculi had been present at the time of the first operation, and had either been overlooked by the surgeon or, on account of the poor condition of the patient, or extensive adhesions around the ducts, their removal had been deemed inadvisable.

To avoid the repetition of this most disagreeable occurrence, viz., the overlooking of calculi in the bile ducts, we have of late followed in all our cases the following procedure. After opening the abdomen, the gall-bladder is exposed and examined. If it is very tense, its contents are withdrawn with an aspirating needle, the puncture opening being then closed by suture or clamp. This relief of tension within the gall-bladder renders palpation of this viscus and the ducts much more easy and satisfactory. The exploring hand is then introduced into the abdomen, along the under side of the gall-bladder, and carried along the under side of the cystic, hepatic, and common

duets. Where these structures are surrounded by adhesions, the latter are divided until they are freely accessible. By rolling the ducts between the fingers, the smallest calculi are easily and readily located. In this way we ascertain at the very beginning of the operation the exact site of any calculi within the gall-bladder and ducts. The hepatic ducts beyond the portal fissure of the liver cannot be palpated, and must, in case calculi are suspected in them, be probed to ascertain the presence of the latter. To make our exploration of the gall-bladder more certain, for small calculi may even with this procedure escape detection, we always palpate the interior of the gall-bladder after it has been incised. Should the patient's condition, or the presence of numerous adhesions around the ducts, make it more advisable to postpone the removal of impacted stones in the cystic, hepatic, or common ducts to a subsequent time, we are in a position to know that a secondary operation will be necessary.

OPERATIONS UPON THE GALL-BLADDER AND DUCTS.

Abdominal Incision.—We usually employ a straight longitudinal incision through the fibres of the right rectus muscle, commencing at the costal arch and extending downward for three or four inches, preserving intact the seventh and eighth dorsal nerves that pass across this field. Where more room than is afforded by this incision is required, *e.g.*, in very obese subjects, this is obtained by making a second transverse incision at right angles to the first one and bisecting it. In very obese subjects, and in those in whom the liver occupies a high position, a transverse incision below the costal arch is made. This affords excellent access to a contracted, deeply-seated gall-bladder and ducts, and does away with the necessity of resecting the costal cartilages.

Postoperative herniæ do not very frequently follow even extensive incisions in this part of the abdominal wall. We have seen several small herniæ in very much relaxed and obese subjects. In those cases in whom the dorsal nerves have been divided there is a weakness of the entire upper portion of the

rectus muscle, which permits of a bulging and protrusion in this region; but even considerable degrees of this are easily controlled by a truss. The writer knows of only one case within the past five years that required operation for hernia arising after an operation for cholelithiasis.

The closure of the abdominal wound is made by layer suture of chromicized catgut. In very fat subjects the layer suture is reinforced by several through-and-through silk sutures. Such through-and-through sutures have very frequently in our experience given rise to extensive stitch-hole abscesses and even phlegmons. Though recognizing this great objection to their use, we do not dispense with them, because we have found nothing else to afford sufficient guarantee against a bursting open of the wound.

Cholecystostomy was performed thirty-eight times, with twenty-seven recoveries and eleven deaths. Of these twenty-seven were done during the acute period, and ten of them succumbed, two in collapse shortly after operation; the others from a more or less rapid but progressive septicæmia, no peritonitis. This would indicate that even a simple surgical procedure performed at a time when there is a virulent infection of the gall-bladder and ducts is attended with grave risks. It would seem as if the operative interference increased rather than diminished the intensity of the infection. The question naturally arises as to the advisability of performing cholecystostomy in the acute cases. We know that simple incision and drainage of purulent collections or gangrenous areas in other organs, *e.g.*, the kidney or appendix, are not attended by results as good as those which the immediate removal of the affected organ accomplishes. The much inflamed, often gangrenous organ, whose vitality is further impaired by the necessary operative manipulations, is an excellent culture ground for the bacteria which are present, and their virulence is very apt to be much increased. Drainage of the gall-bladder is often very unsatisfactory on account of the numerous diverticula and sacculations that result from ulcerations and cicatrices within its cavity. Insufficient drainage and retention

of the products of bacterial life result in progressive septic intoxication, from which the patients finally succumb. During the past year we have in three acute cases performed cholecystectomy. They all made a smooth, uneventful recovery. Naturally all acute cases are not suitable for cholecystectomy; for the separation of numerous adhesions may spread the infection in the gall-bladder to the ducts and peritoneum, or it may be too formidable a procedure for a debilitated or already septic patient to endure. It does seem, however, as though primary cholecystectomy would give better results than simple evacuation and drainage.

Technique of Cholecystostomy.—After opening the abdomen, the gall-bladder is isolated and the surrounding adhesions divided. The contents of the gall-bladder are then evacuated by an aspirating syringe, and the puncture opening temporarily closed by suture or clamp. The gall-bladder and ducts are then carefully palpated, and the presence of any calculi noted. The gall-bladder is incised at its fundus, and the calculi removed. A large-sized drainage tube is put down to the bottom of its cavity and the edges of the opening inverted around the tube by several rows of purse-string sutures of catgut, as suggested by Kehr. The gall-bladder is then attached to the anterior parietal peritoneum, and the outer wound closed except at the site of emergence of the drainage tube. The latter is retained *in situ* by a rubber tube which fits snugly over it, and which is split into two lateral halves for the lower two-thirds of its extent; the lateral portions being affixed to the skin by adhesive plaster. The discharges are carried away to a bottle hanging at the side of the bed, thus preventing soiling of the outer dressings. Drainage is maintained until the bile appears sweet and clean, and the interior of the gall-bladder takes on a healthy appearance. Where the gall-bladder is deeply placed, and cannot be brought up to the abdominal wall, the interval between it and the parietes is packed with gauze, which is made to surround the drainage tube.

The operation is never done in two stages. The objection to this procedure lies in the fact that where stones are im-

pacted in the orifice of the cystic duct, they cannot always be dislodged, and secondary operations become necessary for their removal. In two of the four cases in which cholecystostomy was done in two stages, impacted stones were felt in the orifice of the cystic duct, but could not be dislodged through the fistula; secondary operations were required.

A persistent fistula discharging mucus was observed in seven cases. In four of these secondary operations revealed an impacted stone in the cysticus. In a fifth case, the persistence of a gall-bladder fistula discharging mucus convinced us of the existence of an obstruction in the cystic duct. Secondary operation was advised but declined by the patient. The fistula has persisted for five years, constantly discharging mucus and pus; recently a carcinoma of the gall-bladder developed. (In one other case in which cholecystostomy had been done for calculous empyema of the gall-bladder, a carcinoma of this viscus developed several months after the wound had completely healed. The new growth when the patient returned to the hospital was too extensive to permit of radical operation.)

With the old method of performing cholecystostomy, in which the edges of the incision into the gall-bladder were attached to the skin or fascia, fistulæ were frequent, due to mucosa of the gall-bladder growing out and lining the drainage canal. Such fistulæ had no dependence upon obstruction in the ducts, and could very easily be closed by plastic operation. The discharge from a fistula of this latter type is chiefly bile, in marked contrast to the mucus which issues from a fistula due to cystic obstruction. It is safe to close by plastic operation a fistula discharging bile, if we have previously convinced ourselves of the patency of the common duct, a fact that is readily ascertained by plugging the fistula with a tent and observing whether the bile is discharged into the intestine. It is unsurgical and unsafe to close a fistula discharging mucus or mucus and pus, for in these cases the cystic duct is obstructed, and no vent being afforded to the secretions of the gall-bladder, they accumulate in this viscus, and may cause its rupture, unless relieved by a reopening of the wound.

The persistence of a gall-bladder fistula discharging mucus seems to depend upon a complete closure of the cystic or common bile ducts, either by calculi, or strictures, or kinks, or external compression. As calculi in the choledochus are not apt to be firmly impacted therein, but float up and down according as it is distended or empty, they rarely cause a permanent complete closure of its lumen. The bile and secretions from the gall-bladder from time to time are afforded free discharge into the intestine. Calculi in the cysticus, on the other hand, are very likely, from the structure of the duct, to become firmly wedged at one point and completely obstruct the channel. Our experience would go to show that where the persistence of the fistula is due to the presence of calculi in the ducts, the site of such calculi is in the cysticus. In two of our cases in which a fistula persisted for five and seventeen months respectively, and then closed spontaneously, the calculi were found to occupy the common duct. It is more than probable, however, that these calculi originally, and during the time of the persistence of the fistula, were lodged in the cysticus, and that when they passed on into the choledochus, the fistulæ closed. This assumption is strengthened by the fact that the fistulæ did not discharge bile but bile-stained mucus, an indication of cysticus obstruction.

Cholecystectomy was performed six times, with five recoveries and one death. The Mayo operation (extirpation of the mucous membrane of the gall-bladder) was done three times, with no death. The Mayo operation is an excellent one in quiescent cases. It does not replace cholecystectomy in gangrenous or suppurative cholecystitis, nor in those cases in which the inflammatory process has extended beyond the lining mucosa of the gall-bladder. It is especially valuable in those cases in which, as the Mayos suggest, it is desired to remove the gall-bladder and drain the ducts at the same time. In an ordinary cholecystectomy the cystic duct is closed by ligature: if drainage is required, it is found very difficult to retain a tube in the cystic duct. In the Mayo operation the facilities for drainage are just as good as in an ordinary cholecystostomy,

as the muscular tissue of the gall-bladder affords an excellent pouch for collecting the secretions of the cystic and hepatic ducts, whence they are readily and easily conducted away. We would reserve the ordinary cholecystectomy for the acute cases of gangrenous or suppurative cholecystitis, employing the Mayo operation in the quiescent cases with deeply seated gall-bladders, in which, besides removing this viscus, we desire to establish drainage of the hepatic and cystic ducts.

Technique of Operation.—A peritoneal flap is formed on either side of the gall-bladder, which serves to cover the bed of this viscus after its removal. The organ is then freed from its attachment to the liver, likewise the cystic duct. The artery and duct are separately tied with catgut and the gall-bladder amputated distally to these ligatures. A small cigarette drain is passed down to the stump. Closure of the abdominal wound in layers.

OPERATIONS UPON THE DUCTS.

Cysticotomy was done four times, with three recoveries and one death. The duct was drained in all cases; no permanent fistula remained. In all the cases the cysticotomy was a secondary operation, cholecystostomy being done primarily. Had cholecystectomy been done primarily, these calculi could scarcely have been overlooked.

Combined cholecystostomy and cysticotomy were done in two cases; both succumbed,—one in collapse shortly after the operation, the other from a rapid septicæmia without peritonitis. It seems that operations upon the cystic duct when it is deeply seated and surrounded by adhesions are not well borne. The mobilization of the duct sufficient to enable the operator to incise it is deeply shocking; furthermore, drainage is unsatisfactory, for the tube is likely to be displaced. In acute cases it would seem to be much better to perform a cholecystectomy and then split up the entire length of the cystic duct, and in the quiescent cases to incise the gall-bladder and cysticus throughout their entire extent, remove the calculi, and extirpate the mucosa of the gall-bladder, leaving the muscular tissue of the latter to serve as an aid to drainage.

Choledochotomy was done four times; all recovered; in one of the cases a previous cholecystostomy and in another a primary cysticotomy had been done. Combined choledochotomy and Mayo's operation were done twice; both recovered. Combined cholecystostomy and choledochotomy were done four times; two recovered and two died from continued capillary hæmorrhage. Combined cholecystectomy and choledochotomy were done once, death being due to continued hæmorrhage. Simple or combined choledochotomy was therefore done eleven times, with three deaths from continued capillary hæmorrhage.

HÆMORRHAGE IN JAUNDICED PATIENTS.

Persistent and uncontrollable capillary hæmorrhage has been and continues to be the most lamentable sequela to operations in deeply jaundiced subjects. It is especially apt to follow when the cause of the jaundice lies in a malignant obstruction of the bile ducts. Its cause has been put down to retarded coagulation of the blood. It has been urged to improve this by the internal administration of calcium chloride. Following this suggestion, we have systematically administered the calcium salt in small and in large doses, and have in all cases given it at least five days before operation. Yet during the past year two of our cases succumbed from persistent, uncontrollable capillary hæmorrhage.

It seems to us that the cause of this uncontrollable capillary oozing lies not so much in the retarded coagulation of the blood, as in a fatty degeneration of the walls of the arterioles, which interferes with their contraction and retraction. Physiology teaches that the cessation of hæmorrhage is due to two causes,—chiefly and primarily the contraction and retraction of the arterioles into their sheaths, and secondarily to the clotting of the blood. It is hardly possible that a retardation in the coagulating time of the blood should be responsible for the persistent oozing that occurs in these cases. Were this alone the cause, we would expect that the rapid induction of coagulation by the cautery or styptics, etc., would arrest the hæmor-

rhage. This is not the case; the bleeding goes on, even though we resort to every known therapeutic measure. On the other hand, it is well known that chronic jaundice causes a marked atrophy of all muscular tissue. Such atrophy of the muscular tunic of the blood-vessels interferes materially with their contracting power. The arteriole when divided does not contract and retract within its sheath; its orifice remains patent, and no clot can remain firm over it. The arterial pressure behind the clot forces it off as soon as it forms. To support the pressure, there is need not only of a clot, but of a contracted and retracted arteriole.

If this explanation of the causation of continued hæmorrhage is true, we would expect that the longer the duration of the jaundice the greater would be the tendency to bleeding, for the degeneration should be more marked. This is exactly so, as every surgeon has experienced. Further, we would expect that, as cancerous cachexia, chronic sepsis, and other debilitating influences give rise to a fatty or waxy degeneration of the tissues, patients suffering from these associated diseases would be more apt to bleed than those who suffer from chronic jaundice alone. This is also substantiated by experience; they form the greatest percentage of patients in whom this fatal complication occurs. If we accept this degeneration of the blood-vessels as the cause of this uncontrollable bleeding, we can readily understand why all therapy, including the calcium salt, fails to prevent or check the hæmorrhage, and we will have to expect that from time to time cases will be encountered in which death will follow from the persistent capillary oozing.

Technique of Choledochotomy.—A firm, hard cushion is placed across the lower dorsal region; the common duct is thus brought nearer to the anterior abdominal wall, and the manipulations are rendered much easier. The duct is exposed and rolled between the fingers until it alone is grasped, the portal vein and hepatic artery being displaced to either side. The calculus is steadied between the index and middle fingers of the left hand, and the wall of the duct incised over it. The stone is removed by forceps or scoop. In only two cases was

the duct sutured; no leakage of bile followed. In all the others the duct was drained. Should the stone occupy the retroduodenal part of the duct, it is displaced upward to the free portion of the latter, as it lies in the gastrohepatic omentum. We have not had occasion to practise transduodenal choledochotomy.

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